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The hydrogen bond in dithio acids of pentavalent phosphorus

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Abstract

1. The IR spectra of a number of phosphinic, phosphonic, and phosphoric dithio acids and their solutions in CCl4 were studied in the temperature interval 253-293°K. 2. In pure liquids and their concentrated solutions in CCl4, dimers exist on account of the formation of hydrogen bonds. In this case the SH group emerges as a proton donor; the thione sulfur atom serves as an acceptor in phosphinic acids, while the oxygen of the ether group is the acceptor in phosphonic and phosphoric acids. 3. The hydrogen bond of the SH group with the thiophosphoryl sulfur in phosphinic acids is stronger than that with the oxygen of the substituent of phosphonic and phosphoric acids or dioxane. 4. In dilute solutions in CCl4, noncyclic dithiophosphonic and phosphoric acids exist in the form of two rotational isomers, while cyclic phosphinic acids exist in the form of one isomer. Stabilization of the isomers is probably due to intramolecular hydrogen bonds.

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